GEST Final Report

GEST at the European Parliament, 2014

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Final publishable summary report

Global Ethics in Science and Technology (GEST) brought together high-level Science & Technology (S&T) scholars from Europe, China and India to analyse the incorporation of ethics into S&T policy. The thirty-nine months (February 2011 – April 2014) FP7 funded project focused on the scientific developments in nanotechnologies, food technologies, and synthetic biology in the three regions.

The main output of the project is the *Ethical Framework Analytic Tool*, which provides a practical framework for analysing S&T debates with a particular focus on ethics. The tool distinguishes three main S&T discourses (innovation, risk, power) and two cross-cutting discourses (ethics and public). Values link the two cross-cutting discourses.

Fig. 1 - *Ethical Framework Analytic Tool*

Given the importance of values in the *Ethical Framework Analytic Tool*, GEST analysed fundamental values in the three regions and recognized considerable differences especially between Europe and China. The Enlightenment-derived values of Justice, Dignity, Freedom, Citizen's Rights, Solidarity, and Equality as laid down in the EU Charter stand in marked contrast to the Confucian-and Marxist inspired values of Progress, Affluence, Peace and Harmony. The latter were closer to the Indian values that inspire S&T policy, namely Development, Self-reliance and Scientific Temper.

The *Ethical Framework Analytic Tool* was tested on the governance of nanotechnologies, food technologies, and synthetic biology. The project found that India and China can jointly assess the technological options in several technologies and what socio-ethical aspects need to be studied on a priority basis to ensure that policy making is sensitive to different concerns of various stakeholders. Europe can learn from experiences in India on moving forward the GM debate in food technology. China and India are well placed to explore options for greater collaboration and mutual learning in synthetic biology as they still have to take positions at the global level on dual use and on the linkages between synthetic biology and the Convention on Biological and Toxic Weapons, the Cartegena Protocol on Biosafety and the Convention on Biological Diversity.

Overall, the GEST consortium is very content with the global and regional discussions that the project raised in the last just over three years and it is clear that the impact of the project will continue beyond its official end.

Summary description of the project context and the main objectives

The main objective of GEST was to analyse the concepts and issues surrounding ethics in S&T in Europe and the two main global emerging economies of China and India to create a robust debate that will directly inform science policy.

Ethical and social implications of S&T have been widely debated in Europe in the last two decades leading to a number of policy initiatives that have influenced the development of new technologies. At the same time, Europe is increasingly co-operating and competing with the two major emerging economies of China and India, which are also keen to develop their S&T sectors.

On the one hand, interdependencies between these three global actors require ever closer collaboration, preferably undertaken in a highly transparent manner. On the other hand, S&T debates in each of the three regions follow local dynamics that are not necessarily easily understood, even by expert communities in those regions. Interdependent development (and even positive competition) requires mutual respect and understanding, but this relies upon close collaboration in exploring common issues and significant differences in the governance of ethical and social implications of emerging S&T.

GEST created such collaboration between key S&T policy advisory institutes in the three regions in order to provide a clear understanding of the role of ethics in S&T debates. Three case studies of emerging technologies formed the backbone of comparative analysis: nanotechnologies, food technologies, and synthetic biology.

In detail, GEST's aims were to:

- Explore the state-of-the-art in the debates on ethics in S&T in the three regions with a focus on interdependent scientific developments in the areas of Nanotechnologies, Food Technologies, and Synthetic Biology.
- Explore the social determinants of policymaking in the three regions in terms of public perceptions of risks and benefits, and lay morality.
- Identify common approaches to ethics analysis that can be applied equally in all three regions.
- Promote and support a global debate on the issue of the ethical and social implications of scientific and technological developments with a view to informing national policies.
- Create a high-level policy advisory network of experts from Europe, China and India in order to promote concrete collaboration in the area amongst the three regions.

The main S & T results/foregrounds

Background

The rapid developments in Science and Technology (S&T) raise many ethical questions and regulatory challenges. Addressing these questions and challenges requires an understanding of the impacts of these developments on societies and the development of frameworks and institutions to address them on a continuous basis. In Europe and the USA many initiatives have been developed to address ethical issues and to establish institutional frameworks. Foremost amongst these are ethical guidelines, international protocols and codes of conduct often issued by international organisations and institutions and seeking compliance through national law. For instance, the World Health Organization (WHO) and the UNESCO as well as professional bodies have played an important role in the internationalization of ethics in S&T.

The link to policy from guidelines is often established by Technology Assessment (TA) institute, which advise national governments. For instance, in the US the Bioethics Commission appointed by the President undertakes such a task as and when required. Socio-ethical analysis of technologies also received a boost when as part of Human Genome research the exploration of Ethical, Legal and Social Issues (ELSI) were funded in the US and Europe. Today, many bodies undertake TA and/or ELSI research in new technologies. In China similar initiatives are developing in embryonic form, but no single organization has emerged as the leader. In the case of India, the Technology Information Forecasting and Assessment Council was established with the mandate to undertake TA, but, so far, its work has not had much impact.

GEST contributed to these processes through developing frameworks to facilitate dialogue and bring together policy makers and stake holders.

State-of-the-art of Debates in the Three Regions

Due to their status of economic development, the three regions have different needs, perspectives and priorities in S&T developments that in turn influence the debates on ethics and social impacts of S&T. Nevertheless, many similarities are evident in the roots, processes and even resolutions of some debates. The starting point of the comparison was to look at the attitudes and perspectives in values and belief systems in the three regions.

The fundamental values systems pose the most distinctive feature of the differences that we witness in the three regions. The Enlightenment-derived values of Justice, Dignity, Freedom, Citizen's Rights, Solidarity, and Equality in Europe appear different from those of Progress, Affluence, Peace and Harmony that we see in China, or Development, Self-reliance and Scientific Temper that we see in India. This is perhaps not surprising as trajectories of S&T and the historical developments in each region are different. But, as we have seen in the case of India and China, contemporary understandings of ethics are not necessarily attached to traditional belief systems. For instance, in regions with strong individualistic value systems,

ethics guidelines will focus on autonomy. In regions with strong communitarian values systems, such guidelines cannot capture traditional believes. Instead, they derive their logic from notions of development (mainly economic), social progress and social coherence.

Notably, there are similarities in the official structure of ethics advisory bodies in the three regions. All three regions have established quasi-official institutional structures in ethics advisory at the level of professional associations, healthcare practitioners and environmental organizations. In all three regions there is a clear trend in the institutionalisation of ethics advisory within the official decision-making structures that permeate most national S&T structures.

To obtain an insight into lay morality, as contributing to value systems, GEST drew mainly on public perception survey data in China and Europe. Detailed information was not available in India. We found that the European public appear to have a twofold, perhaps, contradictory view of S&T (at the same time positive and extremely cautious) while the Chinese public seem more inclined to profess an unqualified positive view of S&T. For instance, 89% of Chinese respondents agree that "science and technology make our life healthier, easier and more comfortable", compared to 66% of Europeans. Similarly, on the other side of the spectrum, only 14% of the Chinese sampled agree that "scientists are scary because they have the knowledge and capability to change the world", compared to 53% of Europeans. The limited data that we examined in India point in the general direction of a highly positive view of S&T with some reservations when it comes to developments that have created intense public debates (e.g. GM foods).

In the case of Europe one finds a strong civil society culture that has a direct influence on various debates on specific technologies (e.g. GM foods or nanotechnologies). By contrast, in China and India a far more limited but nevertheless intense civil society participation is evident. The most recent Chinese Government's S&T programme explicitly promotes public participation in decision making, although it is uncertain how this will be realised. In India, civil society groups are organized around specific themes (e.g. Bt Brinjal) with functions focusing on empowerment of marginalized groups to influence policy processes.

The development of Participatory Technology Assessment (pTA) is also not similar in the three regions. pTA is well established in Europe as a means of bringing about a structured stakeholder debate in S&T. In China, with the intense but unstructured civil society sector, pTA is recognized as a positive development but not applied widely as yet. The occasional pTA exercises undertaken in China are the result of isolated institutional initiatives . In India there is no evidence of pTA development at governmental or institutional levels.

Based on this comparison, we identified the parameters on which to base an analytical methodology that can provide in-depth comparisons between the three regions on the discussion and uptake of ethics. The methodology was designed to compare debates on values, rights and ideals aiming at engagement in public discourses on regulations, politics

and governance. These debates are historic, influenced by cultural norms, and reflective. They focus on the risks, and side-effects of science and technology but also on goals and problem-solving possibilities, and thus also on the chances for innovation in various socio-economic contexts.

Mainstreaming Socio-ethical Analysis in the Three Regions

While mainstreaming socio-ethical analysis in S&T policy is important there are many available routes/options. Mainstreaming is an objective and achieving this objective is not easy when socio-ethical analysis is considered irrelevant or an impediment for policy making. The lack of institutions to give priority to mainstreaming are a contributing factor. Another important issue is that of values and normative guidelines that could help mainstreaming. Often bringing allegedly global values into S&T debates (e.g. the Declaration of Human Rights) to guide institutions is resisted as they can be perceived to be impositions from abroad or the values are perceived to be out of context or creating conflicts with current practices. The challenge lies in addressing these concerns, which can be done by identifying values that are acceptable in framing local ethical issues.

The main output of the project is the *Ethical Framework Analytic Tool*, which provides a practical framework for analysing S&T debates with a particular focus on ethics. The tool distinguishes three main S&T discourses (innovation, risk, power) and two cross-cutting discourses (ethics and public). Values link the two cross-cutting discourses.

Fig. 1 - *Ethical Framework Analytic Tool*

In China and India, the innovation discourse is the dominant discourse and S&T policies have objectives that are closely linked to national development, economic competitiveness, self-reliance and strategic interests. Hence the S&T policy making process is more influenced and directed by actors and agencies who articulate the visions that imbibe such objectives. This experience in China indicates that S&T policy processes have provided little scope for other voices and discourses and socio-ethical analysis has not been given much attention. However this is changing as evident in the Science, Technology and Innovation Policy of India and in the initiatives taken by the Chinese Government to assess public opinion and perception and to increase the importance given to ELS issues in S&T policy.

Mainstreaming socio-ethical analysis does not mean that India and China should replicate structures and processes that are found in Europe or the US, nor does it means that they should adopt the same policies for mainstreaming. Mainstreaming as a process will take time to form roots and expand. Hence the modalities of mainstreaming have to develop

taking into account the S&T contexts in both countries and the relationship between S&T and society and the diversity in stakeholders in both countries.

India and China have agencies for technology assessment with significant strengths in undertaking social science research in socio-ethical analysis. Scientific bodies and organizations of scientists have often expressed their interest in understanding the socio-ethical implications of their work. With policy makers acknowledging the importance of understanding socio-ethical implications, the modalities of mainstreaming can be developed. Both countries need to expand further their institutions in Technology Assessment and broaden their mandate to include socio-ethical analysis. The use of public perception surveys could be expanded in China while in India such surveys have to be undertaken systematically. Science Academies, Universities and publicly funded institutions can act as bridges between policy makers and those who do socio-ethical analysis and those who represent other voices.

Thus mainstreaming can be achieved by giving importance to modalities, institutionalizing and through mutual learning. Such an approach would help in mainstreaming that is contextual and appropriate and this would contribute to understanding convergences and divergences in approaches and comparative analysis of value systems and ethical principles in the three regions.

GEST in New Delhi, March 2014

The Cases

Food Technologies in the Three Regions

Mainstreaming socio-ethical analysis in food technologies is an important task but as social impacts and implications are considered in policy making and in technology assessment the major task lies in incorporating ethical concerns and linking that with technology assessment and social impact assessment of food technologies. The idea of ethics varies from region to region, depending on the value system of each. Both India and China have robust systems to assess gains in productivity and measure economic benefits from technological interventions. These can be used effectively to develop socio-economic impacts analysis and also to understand whether technological interventions enhance access to better technologies.

Mainstreaming socio-ethical analysis in food technologies means going beyond productivity oriented innovation discourses to incorporate wider concerns and values in assessing technologies. To do this systematically, would require capacity strengthening in India and China. This could be done through dialogue and consultations with experts, the lay public and farmers who need to interact to know and understand the positions and views of other stakeholders. India and China have a long way to go in this and they learn from Europe as Europe has a rich experience in stakeholder engagement and getting feedback from consumers on technology. However, at the same time Europe can learn from China and India in terms of their strong focus on societal goals (e.g. access, inclusion and equity in science) as part of the S&T Programs.

Similarly India and China can jointly assess the technological options and what socio-ethical aspects need to be studied on a priority basis to ensure that policy making is sensitive to different concerns of various stakeholders. Europe can learn from experiences in India on dealing with different technological solutions and how to move forward the GM debate in food technology.

Nanotechnology in the Three Regions

In nanotechnologies, the innovation discourse was the dominant discourse in all three regions. While nanotechnology is an emerging technology with a universal appeal and application, the capacity of countries to invest in and apply this technology is not uniform. Mainstreaming the socio-ethical analysis of nanotechnology is necessary and is not incompatible with the innovation discourse.

In the case of nanotechnology, modalities to mainstream range from institutionalising structures to support ELSI research with the aim to integrate socio-ethical assessment in decision making. However, when the innovation discourse dominates the policy discourse and regulatory issues are neglected, mainstreaming has to begin with the task of advocacy and to gain space for in policy making. Dialogues with policy makers and scientists to create an understanding that mainstreaming socio-ethical analysis will not hinder innovation or funding nanotechnology can be the first step to convince policy makers and other actors

about the need for mainstreaming. Simultaneously it is important to contextualize mainstreaming on the basis of relevant issues and concrete objectives. For example the need to avert disasters like the Bhopal Gas Tragedy can be and the safety of products can be stressed as a condition to win consumer acceptance.

Synthetic Biology in the Three Regions

The overall discourse in Europe integrates synthetic biology as part of the Knowledge Based Bioeconomy perspective which envisages a greater role for biotechnology and synthetic biology in the transition to the bioeconomy. The term bioeconomy is used in Europe to describe the transition to a more resource efficient society that relies less on non-renewable biological resources . In contrast the discourses in India and China do not give emphasis to the idea of the bioeconomy and they perceive synthetic biology as a continuation of the biotechnology/genetic engineering paradigm.

In China the innovation discourse gives importance to opportunities for China to leap frog using synthetic biology and considers this as a great frontier of modern biotechnology. While the risk discourse in China underscores the case for cautious optimism, there is also a perception that considering ethical issues and risk dimensions at early stages will hinder rather than serve progress. In India while the innovation discourse is dominant, concerns about societal issues and risks are also expressed.

In the case of Europe the discourses on synthetic biology have gone beyond the innovation discourse and given importance to risk aspects, particularly the issue of dual use. Moreover ELSI studies contributed to the policy making on synthetic biology. Thus Europe has a more inclusive understanding and road map for synthetic biology, i.e. the innovation discourse is tempered by the risk discourse and socio-ethical concerns. This has influenced the policy making process. In India and China, the risk dimension is underplayed or considered as a technical issue while in Europe the risk dimension is assessed by focusing on regulation, biosafety and stakeholder involvement in decision making. While public engagement is almost absent in the discourses in India and China, it is given importance in Europe.

It is noteworthy, though, that industry and scientists are aware of issues in biosafety and risk in synthetic biology in China and India and even if civil society is not active in this area, they are likely to press for greater biosafety and more comprehensive regulation and harmonization with global standards and practices. Since scientists are concerned with biosafety and regulation, it may be possible to convince them of the need for a broader perspective which can be provided by socio-ethical analysis.

As synthetic biology is more complex than biotechnology/genetic engineering given the collaboration of inter-disciplinary groups of scientists it will be useful to create spaces of awareness raising and dialogues and debates. National Academies of Sciences and professional bodies can play an important role in this.

Mutual learning between India and China in addressing socio-ethical issues is desirable and as both countries are in the initial stages of development in synthetic biology this is the time to initiate efforts. For example India and China can develop models for public engagement, identify the key issues in biosafety that are of interest to both and consider joint programs in developing biosafety regimes and regulation of synthetic biology.

As both countries have to take positions at the global level on dual use and on the linkages between synthetic biology and the Convention on Biological and Toxic Weapons, the Cartegena Protocol on Biosafety and the Convention on Biological Diversity the scope for joint work on these issues is considerable. This can be used in a deepening of the socio-ethical analysis also. Hence India and China are well placed to explore options for greater collaboration and mutual learning in synthetic biology.

Next Steps

Mainstreaming ethics in S&T policymaking is a major challenge that needs to be addressed flexibly. Given the diverse contexts and the influence of various discourses in policymaking and the normative values embedded in them, it is not possible to suggest a one size fits all model approach.

The Innovation discourse on S&T for development is dominant in China and India while in Europe the institutional mechanisms are in place to consider stakeholder views and bring in ethical values in TA exercises. Mainstreaming can be achieved in many ways and the outcomes need not converge but can result in divergences that are relevant and suitable to the given national context. Besides the suggestions made in different case studies, the project has found that a number of specific steps would be necessary to make mainstreaming more acceptable and relevant in the three regions:

1. Establish common global deliberation platforms on social determinants of S&T
   GEST has been the start of such deliberation platforms. Establishing a permanent platform that will include all major global S&T players will provide space for global deliberation. This would need a focused programme with wide membership and fair financial contribution to establish a regular platform of discussion and instigate research programmes on specific global S&T challenges.

2. Initiate capacity building programmes for common structures on ethics policy advisory
   Our work has shown that proper ethics institutionalisation requires official structures to analyse relevant issues and advice policymakers on the available options for action. TA has taken up this role in most European countries, while pTA has specialised in bringing in divergent stakeholders and engage the public in the process of issue

analysis. Such institutional set-ups would be welcome in China and India. There is scope to instigate capacity building programmes on TA/pTA methodologies in order to allow for similar initiatives to take hold within the particular context of India and China.

3. Promote the development of common S&T social impact indicators
   Impact assessment is important in establishing socio-ethical analysis in any region. Impact indicators are a complex but necessary step in such assessment. The OECD has started this initiative by bringing together an expert group to work further on improving the current set of indicators. The UNESCO and other relevant UN organizations can contribute to this. In this context developing such indicators for emerging technologies is very important. The development of such indicators will also be relevant for research on Responsible Research and Innovation (RRI).

4. Develop comparative systematic public perceptions databases
   Public perception surveys on S&T in general or on specific technologies are important sources of feed back and information. Unfortunately, such surveys are not widely used and that hampers the possibility for direct comparisons between countries and cultures. It would be necessary to have directly comparative public perceptions data in order to reach common understanding and pursue a common analysis. This can be done with the establishment of an expert group that, can devise a common survey to capture the diversity of the values context and the local perceptions of risk and benefit.

5. Promote common templates for public engagement
   Successful public engagement is a serious challenge in all three regions. Europe has a certain tradition in it while India and China are willing to develop structures to promote engagement locally. It would be desirable to develop common templates and structures of public engagement in order to allow for direct comparisons where possible. With respect to national traditions in public discussion and decision making, it may possible to develop common programmes of engagement through established pTA methodologies.

Potential Impact

GEST has achieved considerable impact in its thirty nine months of activities. This covers all three regions involved directly in the project: Europe, India and China. A series of dissemination activities have covered the whole range of issues that GEST dealt with in every region. The activities ranged from regular project newsletters that have been disseminated widely and globally, presentations on GEST that have taken place in all three regions and a series of high level workshops with policy makers that have also taken place in all three regions. Although each of the thirty two activities listed in the ECAS report are important and have increased the impact of the project, it is worth mentioning particularly the following ones:

- A Panel Discussion on Ethics in Science and Technology Policy, 99th Indian Science Congress; that was a high visibility activity in India which involved top social and natural scientists in India, policy makers (e.g. government departments and prime minister's office) and the media. The project was discussed extensively, which helped the subsequent efforts to raise the issue of ethics in S&T in the country.

- Presentation of GEST at ESOF 2012 in Dublin; a high visibility activity targeting the scientific communities in Europe. The project stand was well attended, the project was disseminated in this highly specialized audience and many contacts in Europe were subsequently activated.

- Workshop on "Responsible Governance of Science and Technologies; Perspectives from Europe, China and India" at the European Parliament; this event was sponsored by STOA and it was a high visibility event with a key audience from the European Union policymaking community. This event has already resulted in the submission of common publications with the STOA secretariat and discussions of creating a series of high-level policy events on Responsible Governance.

GEST at the European Parliament, Brussels 2014

- Two events on “China-Europe workshop on Grand Socio-technological Challenges” and “China-Europe workshop on Multidisciplinarity”, both in Beijing; involved a highly targeted audience in China from local scientific associations (e.g. Chinese Academy of Sciences and Social Sciences) as well as relevant policy makers (e.g. Ministry of S&T and Ministry of Health).

- The final GEST conference entitled “Ethics, Equity and Inclusion in Science and Technology: Global and Regional Perspectives” brought together a global group of specialists in a major event in India. The participation of high-level policy representatives (e.g. Secretary-general of Ministry of S&T, Government Departments Directors, etc.) and the media, has created a strong interest in the theme of the project and has resulted in renewed calls to establish a Government S&T Ethics Advisory Body in the country.

Overall, the GEST consortium is very content with the global and regional discussions that the project raised in the last just over three years and it is clear that the impact of the project will continue beyond its official end. We will continue gathering news and initiatives resulting from GEST as we will continue to promote the global discussion on S&T ethics with specific research initiatives in the future.